The Mountain Weather Journal

Volume 3 Issue 3

What's New at the Jackson Weather Forecast Office???

By: Shawn B. Harley
Meteorologist-in-Charge

Greetings from your friends and neighbors at the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service Forecast Office in Jackson, Kentucky.

An exciting project is underway which will benefit the entire state of Kentucky. The Kentucky Climate Center at Western Kentucky University, in partnership with the National Weather Service and the National Climatic Data Center is developing a network of environmental monitoring stations which will span the commonwealth. This network is called the Kentucky Mesonet, and will consist of automated weather stations at approximately 80 different locations. Plans call for the installation of up to 40 stations in 2007, with additional stations being installed in 2008.

The stations will include high quality instrumentation to measure precipitation, temperature, relative humidity, wind speed and direction, solar radiation, soil temperature, and soil moisture. The measurements will be packaged into observations and made available in near real time through the Kentucky Climate Center to the National Weather Service, and other customers and partners, including the public.

This new source of data will enhance the forecast and warning services provided by your National Weather Service. When severe weather threatens, observations from the Kentucky Mesonet will provide ground truth measurements to supplement radar and satellite data. The additional observations will allow forecasters to better pinpoint high threat areas, and will help in the warning decision process.

Observations from the Kentucky Mesonet will also allow the National Weather Service to enhance the high resolution forecast service provided on our webpage at http://weather.gov/jacksonky. At this web site you can click at any point on the map and get a detailed forecast specifically for that location. This is possible since the Jackson National Weather Service Office produces a digital forecast database with a spatial resolution of 2.5 kilometers. The high resolution database allows us to include the effects of terrain in our forecasts, and to depict weather differences on hills, mountains, and in valleys. With the Kentucky Mesonet in place, forecasters will be better able to monitor local meteorological conditions, and will be able to use the data to improve the precision and accuracy of our forecasts.

The next couple of years look to be an exciting time as the Kentucky Mesonet takes shape. As the network comes on line I'll keep you up to date. As always, we would appreciate hearing from you. If you have any comments regarding the services we provide please give us a call, send us an email, or drop us a note. We are constantly striving to improve our products and services and your feedback is important.

Example of a Mesonet Station.
Picture courtesty of the Kentucky Climate Center

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Winter Weather Safety Tips

By: William Modzelewski
Meterological Intern

It is that time of the year again. Winter weather will soon be affecting Eastern Kentucky. Remembering a few safety tips can help keep you safe during the upcoming winter season.

It is important to keep updated on the latest forecasts when winter weather threatens. You can get the latest National Weather Service forecasts from our office by logging on to our web site at `www.weather.gov/jacksonky`. In addition to the latest forecasts, you can get weather information such as watches and warnings, radar images, satellite pictures, and snowfall amounts from around the area. Weather information is also broadcast 24 hours a day on NOAA Weather Radio All Hazards. Forecasts, watches and warnings, current conditions and other weather information are available any time of the day or night. Weather radios are available at many department stores and electronics shops. You can also call our office at 606-666-8000 for recorded forecasts, or speak to National Weather Service personnel if you need more information or have any questions.

The National Weather Service issues a variety of watches, warnings, and advisories to help keep you safe and informed during winter weather situations. A winter storm watch is issued 12 to 48 hours before significant winter weather is expected. This means there is a possibility of snow accumulations of 4 inches or more within12 hours or less, or 6 inches or more within 24 hours or less, freezing rain accumulations of 1/4 inch or more, sleet accumulations of 1/2 inch or more, or blizzard conditions. A blizzard is considered to be occurring when sustained winds or frequent gusts to 35 mph occur with falling or blowing snow, and visibility is frequently reduced to less than 1/4 mile for three hours or more. When the threat of significant winter weather is imminent or occurring, a warning will be issued. When a variety of the above conditions are expected, a winter storm warning will be issued. More specific warnings, such as ice storm warnings, or heavy snow warnings, etc, can also be issued.

Advisories are issued when snow accumulation is expected to be anywhere from 1 to 3 inches, ice accumulations of less than 1/4 inch are expected, localized blowing snow will reduce the visibility to 1/4 mile or less, or sleet accumulations of less than 1/2 inch are expected.

In general, watches and warnings are issued when winter weather is expected to cause a threat to life or property. Advisories are issued when winter weather is expected to cause significant inconveniences, especially to travelers.

When you hear that a winter storm watch has been issued, monitor the latest forecasts. Think about how the storm may affect any travel plans, or your drive to work. Check your food and medicine supplies, heating fuels, and any other essential items to see what you may need should you not be able to go out, or get deliveries for a couple of days. When a warning is issued, make sure you have enough of the items listed above to last for several days. Heavy wet snow, or ice accumulations from freezing rain, can accumulate on tree limbs and power lines. The weight from the snow and ice can cause the limbs and power lines to fall, creating power outages. Make sure you have plenty of blankets, or an alternative heat source should you be affected by a power outage in the cold weather. You may also want to find shelter in the home of a friend or family member if they have not been affected by a power outage.

If you must travel, plan on giving yourself plenty of extra time to reach your destination. In addition to the dangerous driving conditions due to snow and ice, it is important to be alert for any downed tree limbs or power lines.

Cold temperatures and wind speeds combine to create a wind chill factor. The wind chill is an index that indicates how cold the air will feel on uncovered skin. For example, when the wind speed is 15 mph, and the temperature is 30 degrees, the wind chill is 19 degrees. The National Weather Service will issue a wind chill advisory when wind chill values are expected to be minus 10 to minus 24 degrees. We will issue a wind chill warning when wind chills of minus 25 degrees or lower are expected. When you are outside, the best way to protect yourself from frost bite is by dressing in several layers, and making sure that you have as little exposed skin as possible.

Best Wishes for a Safe and Wonderful Holdiay Season from your Friends at the National Weather Service, Jackson, KY

Visit us on the web at:

www.weather.gov/jacksonky

Indian Summer

By: Bonnie Terrizzi
Hydrometeorological Technician

Leaves have changed, often past their peak color, when the warm, hazy southern air blankets the region, sometimes lasting for as much as a week. Indian Summer has arrived. But just what is Indian Summer, and where did the name come from? Blackberry Winter which usually occurs in mid spring, and Indian Summer usually in mid fall, are weather phenomena that are common enough to have acquired a nick-name. It can be defined as *"any spell of warm, quiet, hazy weather that may occur in October or even early November."* The term "Indian Summer" is generally associated with a period of considerably above normal temperatures, accompanied by dry and hazy conditions ushered in on a south or southwesterly breeze. Several historical references make note of the fact that a true Indian Summer can not occur until there has been a killing frost or freeze.

Writing about life in America, an early American writer well described Indian Summer when he wrote, "The air is perfectly quiescent and all is stillness, as if Nature, after her exertions during the Summer, were now at rest." Although written in 1817, this passage belongs to the writer John Bradbury, is still relevant today.

The usage of the term "Indian Summer" dates far back in American history. According to the research of a Michigan National Weather Service employee, Bill Deedler, who describes himself as a "Weather Historian", the term "Indian Summer" dates back to the 18th century in the United States. Credit for the first usage of the term was mistakenly given to a man by the name of Major Ebenezer Denny, who used it in his "Journal", dated October 13th, 1794. The journal was kept at a town called Le Boeuf, which was near the present day city of Erie, Pennsylvania. But an earlier usage of the term was discovered in a letter written by a Frenchman named St. John de Crevecoeur, dated "German-flats, 17 Janvier, 1778." The following is a translation of a portion of the letter: "Sometimes the rain is followed by an interval of calm and warmth which is called the "Indian Summer"; its characteristics are a tranquil atmosphere and general smokiness. Up to this epoch the approaches of winter are doubtful; it arrives about the middle of November, although snows and brief freezes often occur long before that date."

Since Monsieur Crevecoeur says, "it is called the "Indian Summer"", obviously one could argue that term would have had to be used before him and become popular, but by whom? It is a question of weather lore lost to history.

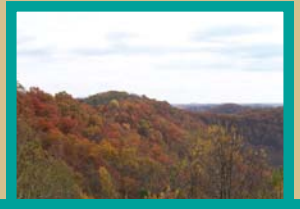
There is debate over the origin of the term itself, "Indian Summer". One explanation of the term "Indian Summer" might be that the early native Indians chose that time of year as their hunting season. This seems reasonable seeing the fall months are still considered the main hunting season for several animals. Also, the mild and hazy weather encourages the animals out, and the haziness of the air gives the hunter the advantage to sneak up on hiss prey without being detected. Taking this idea one step further, Indians at that time were known to have set fires to prairie grass, underbrush and woods to accentuate the hazy, smokey conditions. There are some rather derogatory explanations as to the origin of the Indian Summer terminology which did not come about until the early 1900s. Those theories are discounted today.

Another hypothesis, having nothing at all to do with the Native Americans, was put forward by an author by the name of H. E. Ware, who noted that ships at that time traversing the Indian Ocean loaded up their cargo the most during the "Indian Summer", or fair weather season. Several ships actually had an "I.S." on their hull at the load level thought to be safe during the Indian Summer. In any event, there are several theories or possibilities of the explanation and origin of the term "Indian Summer", yet no one theory has actually been proven.

A typical weather map that reflects "Indian Summer" weather involves a large area of high pressure along or just off the East Coast. Occasionally, it will be this same high pressure that produced the frost or freeze conditions only a few nights before, as it moved out of Canada across the Plains, Midwest and Great Lakes and then finally, to the East Coast. Much warmer temperatures, from the deep South and Southwest, are then pulled north on southerly breezes resulting from the clockwise rotation of wind around the high pressure. It is characteristic for these conditions to last for at least a few days to well over a week and there may be several cases before winter sets in.

Such a mild spell is usually broken when a strong low pressure system and attending cold front pushes across the region. This dramatic change results from a sharp shift in the upper winds or "jet stream" from the south or southwest to northwest or north. Of course, there can be some modifications to the above weather map scenario, but for simplicity and common occurrence sake, this will be the general weather map.

All in all, even with the variety of opinions on this weather (or seasonal) phenomenon, the most popular belief of Indian Summer is as follows: It is an abnormally warm and dry weather period, varying in length, that comes in the autumn time of the year, usually in October or November, and only after the first killing frost or freeze. There may be several occurrences of Indian Summer in a fall season or none at all. Enjoy Indian Summer while it's around, because one thing is for certain, it never lasts!



A view from the National Weather Service in Jackson

Weather Folklore

By: Bonnie Terrizzi
Hydrometeorological Technician

Long before there was television with instant access to weather information, or the Internet, or radio, or even electricity, man needed to know how to forecast the weather. Before instruments were developed to measure the elements of the atmosphere, man carefully used his eyes and his senses to try and guess the whims of Mother Nature. His only resource was to use his already intimate knowledge of his environment, and to use the clues provided by Mother Nature herself.

By using careful observations of the world around them, our forefathers were more weather savvy than we give them credit for being. Even before written history, our forefathers prepared an oral history, and a large part of this oral history involved passing down observations pertaining to weather prediction. Although today, many educated people dismiss old time weather lore as fables that were designed to explain the mysteries of nature, the sayings themselves still exist. Perhaps there is enough accuracy in the old observations that keep them from completely dying?

Of course, **not all weather folklore sayings actually worked at predicting the weather, but many did indeed have a basis in scientific fact.** Let's take a look at some that have been around a long, long time and the reasons that some of them actually do work.

One of tthings that our ancestors understood far better than the average person does today is the moon. It was the early calendar and produced a sense of wonder. ***"If the new moon holds the old moon in her bosom the weather will be fair."*** This occurs due to clear, stable and dry air that is usually proceeding a high pressure system. It is this clarity of the air that enables you to see the dark part of the crescent moon holding the old moon. This is usually a good predictor of 24 to 48 hours good weather.

"A ring around the moon brings rain or snow." Another similar saying is, ***"When the moon is in her house, rain or snow will come."*** Cirrus clouds that are very thin and high in the atmosphere are the reason that a 'ring', or 'halo' is visible around the moon. These high, thin clouds typically proceed an approaching low pressure system that is bearing moisture.

Even today's school children have heard the old proverb about red skies and sailors - even though the days are long gone when sailing ships plied the seas.

Red sky at night, sailors delight
Red sky at morning, sailors take warning

OR the similar verse that says:

Evening red and morning gray,
sends the traveler on his way.
Evening gray, morning red,
brings the rain down on his head.

Even the New Testament recorded similar wisdom in the Bible, where Jesus in Matthew 16, 2-3 is quoted as saying, **"When it is evening, it will be fair weather: for the sky is red. And in the morning it will be foul weather today: for the sky is red"** when he was speaking to the Pharisees.

At dusk, a red sky indicates that dry weather is on the way. This is due to the sun shining through dust particles being pushed ahead of a high pressure system bringing in dry air. A red sky in the morning is due to the sun again shining through dust. In this case however, the dust is being pushed on by an approaching low pressure system bringing in moisture. Don't confuse a red sky in the morning with a red sun in the morning. If the sun itself is red and the sky is of a normal color, either at sunset or sunrise, then the day itself is predicted to be fair. How do you know if the reflected light shining through the dust is from an approaching low pressure system or a high pressure system? Perhaps that is why the old sayings don't always work out.

Look for more discussions on weather folklore in upcoming articles. There are sayings about chirping crickets, woolly worms, and the sounds of katydids on a summer's evening. There are guidelines about blackberries and acorns. Numerous sayings abound about animals; from the behavior of dogs and cats, to the flight patterns of birds. Every so often, just for fun, we will look at some more of these sayings and look to the grains of science behind them.

If you have your own favorite folklore saying that you just know never fails, send it to us and we will discuss it in upcoming articles. Send your folklore via email to: bonnie.terrizzi@noaa.gov, or through the regular mail to National Weather Service, Folklore Collection, 1329 Airport Road, Jackson, KY 41339.

Meanwhile, for a more accurate predictor of the upcoming weather, visit our Internet web site at:

http://www.crh.noaa.gov/jacksonky

Tech Tips

By: John Jacobson
Lead Forecaster

Here are a few websites you may want to look at. These web sites are the favorites of some of the forecasters here at the Jackson office.

http://weather.gov/jacksonky Jackson Weather Forecast Office homepage

http://www.crh.noaa.gov/climate/ Climate resources page

http://kyclim.wku.edu/ The Kentucky Climate Center webpage

http://wwwagwx.ca.uky.edu/ The University of KY Agricultural Weather Center Page

http://weather.gov/climate/xmacis.php?wfo=jkl To find climate information for eastern Kentucky

http://cpc.ncep.noaa.gov Long range weather/climate predictions

http://hdsc.nws.noaa.gov/hdsc/pfds/ Precipitation Frequency Data

http://www.rap.ucar.edu/weather/ Real time weather data from UCAR

http://www.aviationweather.gov/ Aviation Weather Center

http://iwin.nws.noaa.gov/iwin/iwdspg1.html For text data

http://www.spc.noaa.gov/exper/ For severe weather analysis

http://www.nco.ncep.noaa.gov/pmb/nwprod/analysis/ For model data

http://amsu.cira.colostate.edu/gpstpw/ For perceptable water (how much moisture is available to produce rainfall.)

Weather Facts

By: Tabitha Brewer
Administrative Support Assistant

Heat Bursts are an odd atmospheric event that occus in thunderstorms. An occasional parcel of air is pushed down from 20,000 feet to the surface, warming by compression all the way down.

Lightning bolts can jump 10 or more miles from their parent cloud into regions with blue skies.

The odds of being struck by lightning is approcimately 1 in 800,000.

Only 2% of U.S. tornadoes reach “violent” intensity, yet those few results in 70% of all tornado deaths. Winds in these tornadoes exceed 200 mph and can stay on the ground for an hour or more.

Tree crickets are called the poor man’s thermometer because temperature directly affects their rate of activity. Listen for a cricket and count the number of chirps it makes in fifteen seconds. Add 37. The sum will be the Fahrenheit temperature almost exactly.

Poplar trees and red and siver maples flip up their leaves when air pressure is low and rain is imminent.

Dark clouds are storm clouds. They have a high ice crystal content, light has trouble passing through them, making the clouds appear dark. Eventually, the crystals become so heavy they fall to the earth either as snow (when the air is cold) or rain (when the air is warm.)

On April 1, 1960, Tiros I, the world’s first weather satellite was launched from the U.S.

It takes about one million cloud droplets to provide enough water for one rain drop.

The estimated temperature of lightning is 50,000 degrees Fahrenheit, hotter than the surface of the sun.

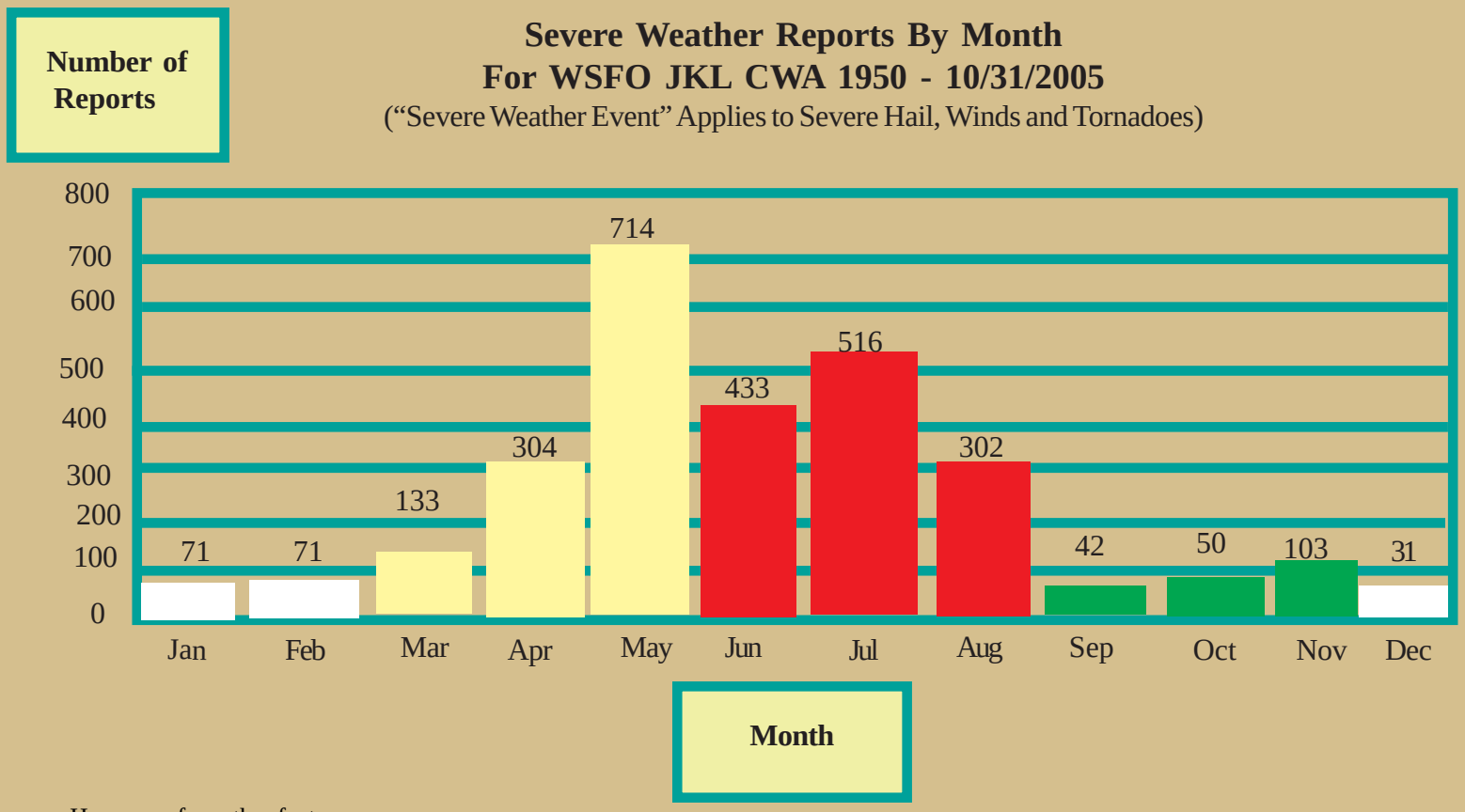
Fall Severe Weather

By: Tom Johnstone
Warning Coordination Meteorologist

What do the nation's strongest tornado in 2005 and the longest track tornado in Kentucky since 1974 have in common? They both happened during autumn severe weather outbreaks across the Bluegrass State.

We all know about spring and severe weather. Spring and violent weather seem to go hand-in-hand for much of the southern and central United States, and Kentucky is often in the weather crosshairs. During this transition from winter to summer, the clash of warm moist air colliding with the cold dry Canadian air nearly always sets the stage for some of the most violent weather that Mother Nature has in her arsenal.

According to the National Weather Service's Storm Prediction Center (SPC), May and June are the peak months for severe weather. Unknown to many, however, is that late autumn also has a surge of severe weather. This "second season" occurs mainly across the southeast portion of the United States, including Kentucky, with November as the focus of the greatest number of severe weather instances. Take a look at the following graph and notice how severe weather reports by month actually go up in November across eastern Kentucky before decreasing again in winter.



Here are a few other facts...

* The nation's strongest tornado in 2005 occurred in Kentucky - the Hopkins county F4 that struck Nov. 15, 2005. This was the strongest tornado in KY since the May 28, 1996 Bullit county F4.

* The F3 tornado that was spawned over Henderson County KY around 2 AM on Nov. 6, 2005 killed 25 people just as it crossed into Vanderburgh County, Indiana. A separate F3 tornado occurred in Crittenden County KY during the same hour.

* The longest track tornado in Kentucky since April 3, 1974 occurred on Nov. 15, 2005 cutting a 44.1 mile path of F3 destruction across Graves, Calloway, Marshall and Lyon counties.

Fall Severe Weather (Continued)

By: Tom Johnstone
Warning Coordination Meteorologist

Why a resurgence in tornado potential in the autumn months? It all has to do with a combination of fast Jet Stream winds and strong frontal systems which reappear in fall.
During the late summer months thunderstorms are common, but winds throughout the atmosphere rarely are strong enough to allow tornadoes to form. During the spring and fall however, a strong gradient of temperatures across the hemisphere typically drives powerful Jet Stream winds, and creates much stronger frontal systems which help initiate thunderstorm development.

Over the last decade, the lower Ohio/middle Mississippi Valley, including much of Kentucky, has been an area with one of the highest frequencies of strong to violent tornadoes in the United States. Several of these violent and deadly tornadoes have occurred during the fall, a time not many Kentuckians associate with severe weather. Remember...tornadoes and other forms of severe weather can happen anytime of the year, day or night. It is critical for your family to have a severe weather plan, and be ready to put that plan into action year round._

The National Weather Service is looking for pictures of significant weather events that have taken place in our County Warning Area. If you have any pictures that you would be willing to share with us, please contact Tabitha at tabitha.brewer@noaa.gov or call (606) 666-8000, Press 0 for Operator.

Incident Meteorologists

By: Tony Edwards
General Forecaster/IMET

Wildfire in Colorado

Wildfires over the western United States made news this past summer and fall with nearly 10 million acres now burned in locations from Texas to Alaska. As one would imagine, the weather has a dramatic effect on wildfire behavior and accurately predicting elements such as the wind speed and direction in and near the fire area can save property and lives. One little known element of the National Weather Service is the Incident Meteorologist, who is charged with providing just such specially tailored forecast information in high impact events.

Currently there are around 60 specially trained Incident Meteorologists, IMETs, located in Weather Forecast Offices across the United States, including three here at the Jackson Weather Office. IMETs can be called on in a moments notice and dispatched anywhere in the country to assist emergency responders to wildfires and other incidents ranging from oil spills to hurricane landfalls. In fact, incident meteorologists have been protecting the nation's incident responders since 1910.

Fire RAWS portable weather station

Observations are also key in detailing the weather conditions in and around the incident so IMETs can have portable weather stations installed at strategic locations on the incident perimeter. These stations have instruments which measure the air temperature, relative humidity, wind speed and direction, including gusts, rainfall amounts, and fuel stick moisture. IMETs also have the ability to release small balloons, which when tracked with an instrument called a theodelite track the winds above the surface.

So, the next time wildfires make the headlines, whether in the forests of eastern Kentucky or out west, Incident Meteorologists are likely to be on scene working hand-in-hand with the fire fighters and emergency workers, continuing the National Weather Service's mission of protecting lives and property!

Remembering April 1977…

By: Britt Westergard
Service Hydrologist

It is difficult to believe that it has been nearly 30 years since the devastating flooding of April 1977 which affected the Big Sandy, Cumberland and Kentucky River basins in eastern Kentucky, as well as rivers in three other states (WV, VA, TN). While the possibility remains that one day we will again experience the magnitude of rainfall that caused the flooding in April 1977, some significant improvements in National Weather Service science and technology would keep local communities more prepared and informed if the same flood were to happen today.

In April of 1977, beginning in the early morning on Monday the 4th and continuing through Tuesday the 5th, a bull's eye of approximately 15.5 inches of rain fell in a period of about 30 hours over the headwaters of the Tug and Levisa Forks of the Big Sandy River. Contributing to the water moving down from the headwaters, areas throughout southeast Kentucky received between 5 and 9 inches of rainfall, according to a "bucket" survey of various containers that were left out during the heavy rain. The resulting flooding brought most points along the Cumberland to record flood, caused record flooding at Elkhorn City and major flooding elsewhere in the Big Sandy River Basin, and even caused moderate flooding along the Kentucky River. Record flooding in the Cumberland overtopped the Pineville floodwall and would have overtopped the Barbourville floodwall had it not been for sandbagging efforts that contained a crest higher than the floodwall. Fifteen counties in eastern Kentucky were declared disaster areas: Bell, Breathitt, Floyd, Harlan, Johnson, Knott, Knox, Lawrence, Leslie, Letcher, Magoffin, Martin, Perry, Pike and Whitley. In Kentucky alone, there were 10 flood-related deaths and total flood damage costs were estimated at just over $175 million (which is over $500 million in today's dollars).

Looking back at how much the National Weather Service has accomplished in eastern Kentucky in 30 years:

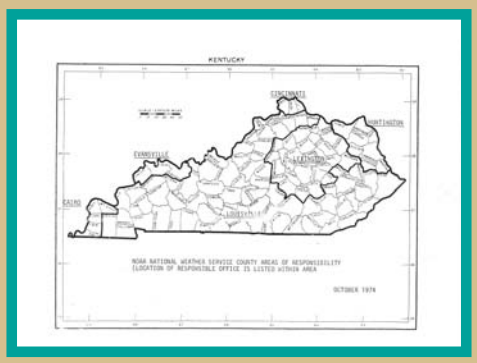
Weather radars have long been used to get estimates of how much precipitation has fallen in an area. In 1977, the area was served by radars in Louisville, Covington and Bristol, TN. The Bristol radar was the closest, however was unable to give accurate rainfall estimates because the radar beam was blocked by the high mountains of southeastern Kentucky. Today, eastern Kentucky is served by the radar in Jackson, with supplemental information from the surrounding radars in Wilmington, OH, Louisville, KY, Charleston, WV, and Morristown, TN.

The accuracy of river forecasts depends greatly on current observations of the river's level – receiving these observations as frequently as possible during a flood event improves crest forecasting. In 1977, there was one river gage in Glenn Hayes, WV that reported river heights via satellite; all other river and rainfall observations whether collected automatically or by an observer were relayed to the National Weather Service by telephone. When telephone lines failed during the flooding, river forecasts were based on old or even nonexistent river and rainfall reports. Today, in Jackson's service area alone, there are 65 automated gages which report over the satellite network; most of these report either rainfall or river height and some report both. If telephone lines were to fail, the National Weather Service would still have current observations upon which to base their river forecasts and warnings.

If telephone lines fail and there are forecasts and warnings issued, the best way to receive these urgent weather messages is via NOAA Weather Radio (NWR) All-Hazards. In 1977, there were NWR transmitters in Somerset, Hazard, Ashland and Lexington to serve eastern Kentucky; with the terrain, this left many areas without NWR reception. Also, in the midst of the flooding in April of 1977, the Hazard transmitter lost power and was off the air. Today, watches and warnings are broadcast on 20 NWR transmitters in our service area, all but three of which have backup generators in the event of power failure (these three are scheduled to receive generators in the near future).

Finally, the biggest change we have made in the way we serve eastern Kentucky is the Weather Forecast Office (WFO) in Jackson! In April of 1977, the Louisville office had responsibility for most of the counties in eastern Kentucky (see Map 1), whereas today WFO Jackson covers most of the areas in Kentucky affected by the 1977 flood (see Map 2). Furthermore, the WFO in Jackson is staffed with a Service Hydrologist, a full time employee dedicated to improving flood, flash flood and drought services in eastern Kentucky.

Map 1



Map 2

The National Weather Service

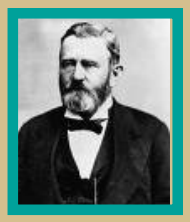
By: Ed Ray
General Forecaster

From some of the earliest records of the history of this country, it is known that many had taken a strong interest in the day to day weather. Our Founding Fathers as well as other colonial leaders were very interested in the weather. Thomas Jefferson bought his first thermometer while writing the Declaration of Independence, and purchased his first barometer a few days following the signing of the document. Incidentally, he noted that the high temperature in Philadelphia, PA on July 4, 1776 was 76 degrees. Thomas Jefferson kept daily records of weather at Monticello from 1772 to 1778. George Washington also took regular observations; the last weather entry in his diary was made the day before he died. However, most records such as these had been sporadic and sparse to say the least, and the need for reliable and consistent measurements of atmospheric phenomena became greater with time.

Consequently, the National Weather Service as we know it today came about as a result of Nineteenth Century science and policy. The Army Surgeon General began a coordinated attempt to obtain weather observations from Army posts as early as 1814. Then during the late 1840's and 1850's, a national network of observers collected and telegraphed observations to the Smithsonian in Washington D.C.

About this same time, Professor Cleveland Abbe, while director of the Cincinnati Observatory in Cincinnati, Ohio, had begun to collect regional weather reports in order to present them in the form of maps. Professor Cleveland Abbe published his first CINCINNATI WEATHER BULLETIN on September 1, 1869. The bulletin contained observations telegraphed from distant observation posts and announced 'probabilities' for the next day's weather.

Halbert E. Paine



Ulysses S. Grant

The usefulness of this product was quickly realized, for commerce and the protection of property from major weather events, and even public safety. Individuals such as Professor Increase A. Lapham of Milwaukee and Colonel Albert J. Myer, Chief of the Signal Service, along with organizations like the New York Chamber of Commerce saw an increasing duty of the government to become more involved. General Halbert E. Paine, Congressman for Milwaukee agreed and presented a congressional resolution in 1870 which required the secreatary of war to establish a meteorological observing network at military stations and to provide notice of "the approach and force of storms" on the Great lakes and seacost. The Resolution was passed by Congress and signed into law on February 9, 1870, by President Ulysses S. Grant. At 7:35 a.m. on November 1, 1870, weather observations were taken by 24 government observers and telgraphed to Washington DC and other cities. With this transmission, a weather agency came into being called the the Division of Telegrams and Reports for the Benefit of Commerce and was placed under the Signal Service Corps Bureau.

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In 1871, Professor Cleveland Abbe also became part of the infant agency as Special Assistant to the Chief Signal Officer. Following a month of practice, it was decided that Abbe's forecasts, covering the next 24 hours, more than filled popular expectations. This original weather agency continued to operate under the War Department from 1870-1891 with headquarters in Washington, D.C. Then from 1891 to 1940, the Weather Bureau was part of the Department of Agriculture.
After recognizing the important role that the Weather Bureau played for the aviation community, and therefore commerce, President Franklin D. Roosevelt transferred the Weather Bureau to the Department of Commerce in 1940 where it remains today. In 1970, the name of the Weather Bureau was changed to the National Weather Service, and the agency became a component of the Commerce Department's newly created National Oceanic and Atmospheric Administration.

Today, more than 135 years later, thousands of weather observations are made hourly and daily by government agencies, volunteer/ citizen observers, ships, planes, automatic weather stations and earth-orbiting satellites with the mission of protecting life and property. The National Weather Service Office in Jackson, Kentucky plays an important role in this mission.

The National Weather Service office in Jackson was established as a result of tragic flooding that occurred April 2-5, 1977. Torrential rainfall led to over 15 inches of precipitation across Kentucky, West Virginia, Tennessee, and Virginia. Classified as a 500 year flood, 22 people lost their lives and property damage was counted in the hundreds of millions of dollars. Damage assessments and recommendations that followed led to a station being built at the Jackson/Julian Carroll Airport. Breathitt County was selected as a site due to its centralized location based on existing National Weather Service offices and radars. Construction took placed through late 1979 and 1980. The office opened and was officially commissioned on January 1, 1981, and continues to serve the communities of Eastern Kentucky.

Frost

By: Tabitha Brewer

On those chilly mornings when you look out your window and see frost covered windshields and grass, do you ever wonder what causes frost? I do, so I did a little research and this is what I found:

In order for frost to form, there are certain conditions that must be met. There must be sufficient water vapor in the air and the dew point temperature must fall below freezing (32ºF). When these conditions are met, frost occurs through a process called deposition. Deposition is the conversion of water vapor into ice skipping the liquid phase all together. When there is sufficient water vapor in the air, but the dew point temperature does not fall below freezing (32ºF), then dew is formed.

There are two main types of frost: Hoar frost and Rime frost.

Hoar frost forms through the slow deposition of water vapor directly on a surface as ice. It forms best when winds are light, which usually occurs on a clear, cold night. Hoar frost accumulates slowly and forms delicate interlocking crystals that grow outward from the surface with a feather, fern or flower pattern. It grows in steps or layers. Hoar frost appears white because small air bubbles are trapped in the ice and reduce its transparency. It glitters in the sunlight, particularly early in the morning as the sun rises, and gives the illusion of a winter wonderland. This is the type of frost that we see the most of in our area. You have to get up pretty early in the morning in order to see it in all its glory because it melts quickly when the sunlight hits it. (See the pictures below.)

Rime frost, on the other hand, is found in the more mountainous regions such as Colorado and Montana. Rime frost occurs rapidly, changing from the liquid stage to the ice stage quickly. It forms best when winds are moderate and there is high atmospheric water content. It gives a dull, matte finish to the surface it forms on. Rime frost is most common during cold fogs, when water droplets come in contact with subfreezing surfaces or when moisture-laden clouds are forced over cold mountain slopes. Rime frost grows toward the wind direction. Accumulations of Rime frost can reach a thickness of three feet or more. (See the pictures below.)

When frost occurs depends largely on latitude. Areas that are farther to the north reach 32ºF sooner than areas south. Valley locations can receive the first frost before the ridges. For example, the Jackson Weather Service Office with an elevation of 1381 feet can expect to see 32ºF around October 26th while West Liberty with an elevation of 830 ft. can expect to see 32ºF around October 6th. The Weather Service issues two products, a Frost Advisory and a Freeze Warning, when dealing with the cooler temperatures. A Frost Advisory is issued when widespread frost is expected. A Frost Advisory is issued until a killing freeze occurs. A Freeze Warning is issued when temperatures are expected to be below 32ºF over a widespread area. Once a killing freeze occurs, the Freeze Warning is no longer issued. For more information on frost, visit our web page at www.weather.gov/jacksonky.

Examples of Hoar Frost

Examples of Rime Frost

KID'S KORNER

By: Anthony Richey
General Forecaster

Basic Types of Clouds

Cirrus clouds are made of ice crystals and look like feathers or strands of white hair. This type of cloud forms about 20,000 feet above the ground.

Example # 1: Cirrus

Example # 2: Cumulus

Cumulus clouds are small puffy clouds that look like balls of cotton floating in the air. This type of cloud forms on warm sunny days and is made of tiny drops of water. This type of cloud forms less than 6,500 feet above the ground.

Stratus clouds are gray flat clouds that form in layers less than 6,500 feet above the ground. This type of cloud is made of tiny drops of water and usually covers the whole sky. Very light rain or snow sometimes falls from stratus clouds.

Example # 3: Stratus

Example # 4: Cumulonimbus

Cumulonimbus clouds or "thunderheads" are very large white clouds with flat bottoms, cauliflower shaped middles, and feathery looking tops. This type of cloud is made up of both tiny drops of water and ice crystals and can produce lightning, thunder, heavy rain, hail, and tornadoes.